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ABSTRACT

This is one form of three performance checks booklets (A, B, and C) for two texts of Level III of the Intermediate Science Curriculum Study (ISCS). These two texts are Why You're You (WYY) and Investigating Variation (IV). The 12 performance checks booklets for Level III are considered one of four major subdivisions of a set of individualized evaluation materials for Level III of the ISCS. This booklet (form B), developed to assess the students' achievement of the objectives of the WYY and IV texts of Level III, contains a set of performance checks which are equivalent to the performance checks of the other two forms (A and C). Each performance check has its own code number which indicates the unit number and identifies whether it is based on core material or excursions. Directions for students' use of performance checks are also included. (HM)

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INTERMEDIATE SCIENCE CURRICULUM STUDY

ISCS

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INDIVIDUALIZED TESTING SYSTEM

Performance Checks

ISCS LEVEL III
WYY-IV
FORM B

SE 028 477

SILVER BURDETT
GENERAL LEARNING CORPORATION
Morristown, New Jersey · Park Ridge, Ill. · Palo Alto · Dallas · Atlanta

INDIVIDUALIZED TESTING SYSTEM

ALL LEVELS	**Individualizing Objective Testing** (an ITP module) **Evaluating and Reporting Progress** (an ITP module)
LEVEL I	**Performance Objectives,** ISCS Level I **Performance Checks,** ISCS Level I, Forms A, B, and C **Performance Assessment Resources,** ISCS Level I, Parts 1 and 2
LEVEL II	**Performance Objectives,** ISCS Level II **Performance Checks,** ISCS Level II, Forms A, B, and C **Performance Assessment Resources,** ISCS Level II, Parts 1 and 2
LEVEL III	**Performance Objectives,** ISCS Level III **Performance Checks,** ISCS Level III, ES-WB, Forms A, B, and C WYY-IV, Forms A, B, and C IO-WU, Forms A, B, and C WW-CP, Forms A, B, and C **Performance Assessment Resources,** ISCS Level III, ES-WB WYY-IV IO-WU WW-CP

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FOREWORD

To implement an educational approach successfully, one must match the philosophy of evaluation with that of instruction. This is particularly true when individualization is the key element in the educational approach. Yet, as important as it is to achieve this match, the task is by no means simple for the teacher. In fact, without specific resource materials to help him, he is apt to find the task overwhelming. For this reason, ISCS has developed a set of individualized evaluation materials as part of its Individualized Teacher Preparation (ITP) program. These materials are designed to assist teachers in their transition to individualized instruction and to help them tailor their assessment of students' progress to the needs of all their students.

The two modules concerned with evaluation, *Individualizing Objective Testing* and *Evaluating and Reporting Progress*, can be used by small groups of teachers in in-service settings or by individual teachers in a local school environment. Hopefully, they will do more than give each teacher an overview of individualized evaluation. These ITP modules suggest key strategies for achieving both subjective and objective evaluation of each student's progress. And to make it easier for teachers to put such strategies into practice, ISCS has produced the associated booklets entitled *Performance Objectives, Performance Assessment Resources,* and *Performance Checks*. Using these materials, the teacher can objectively assess the student's mastery of the processes, skills, and subject matter of the ISCS program. And the teacher can obtain, at the moment when they are needed, specific suggestions for remedying the student's identified deficiencies.

If you are an ISCS teacher, selective use of these materials will guide you in developing an individualized evaluation program best suited to your own settings and thus further enhance the individualized character of your ISCS program.

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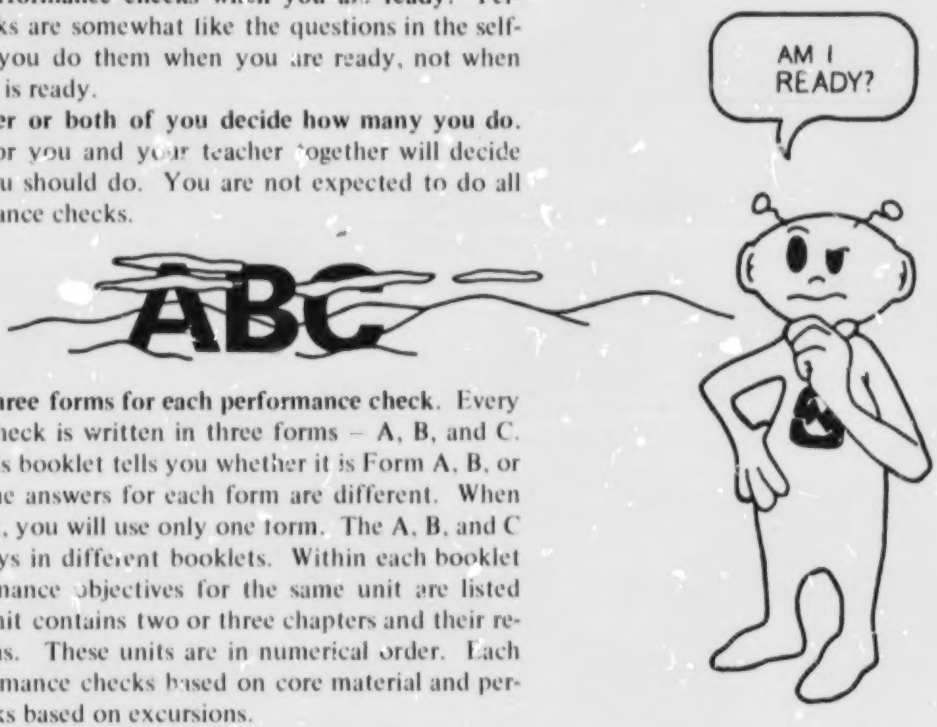
NOTES TO THE STUDENT

Now that you have completed several chapters, excursions, and self-evaluations, you are ready to help your teacher determine how well you are doing. The performance checks in this book will provide your teacher with this information. Then your teacher can help you with things you may not understand and can keep a record of your progress.

Read the next section carefully. It explains some important things about the performance checks in this book, and it gives you specific suggestions for using them.

What You Need To Know about Performance Checks

1. **You do performance checks when you are ready.** Performance checks are somewhat like the questions in the self-evaluations – you do them when you are ready, not when the whole class is ready.
2. **Your teacher or both of you decide how many you do.** Your teacher or you and your teacher together will decide which ones you should do. You are not expected to do all of the performance checks.



3. **There are three forms for each performance check.** Every performance check is written in three forms – A, B, and C. (The title of this booklet tells you whether it is Form A, B, or C.) Usually the answers for each form are different. When you do a check, you will use only one form. The A, B, and C forms are always in different booklets. Within each booklet all the performance objectives for the same unit are listed together. A unit contains two or three chapters and their related excursions. These units are in numerical order. Each unit has performance checks based on core material and performance checks based on excursions.
4. **Each performance check has its own number.** The number is in the outside margin of the page and will look like this: IV-03-Core-17A or WYY-02-Exc 4-2-2A. These numbers mean

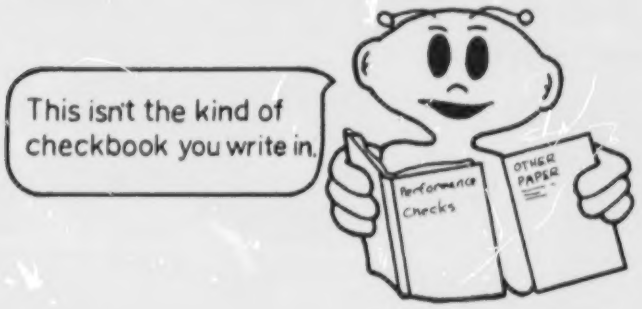
IV	- 03	- Core	- 17	A	and	WYY	- 02	- Exc	4-2	- 2	A
text	unit	based on core material	check number	form of the check		text	unit	based on excursion material	excursion number	check number	form of the check

5. **Each performance check is separated from the other.** There is a line before each performance check and one after it. Some performance checks have several parts, so do everything called for between the lines. If there is no line at the bottom of a page, the check is continued onto the next page.

6. **Sometimes you will need to use equipment.** If special materials are needed, they will be in boxes labeled with the same number and sometimes the same letter too as the performance check for which you need them.

7. **Some performance checks have two or more answers.** If more than one answer is correct, you must select all the correct choices. In such cases, selecting just one answer is not enough.

8. **Some performance checks have no answers.** Occasionally, you may be asked to do something that is impossible and to explain your answer. If so, say that the task is impossible and explain why.



9. **You share books of performance checks and YOU DO NOT WRITE IN THEM.** Write your answers on other paper. Give the number and form of the performance check for each answer you write. If you are to draw a graph, a chart, or a map, your teacher may provide you with grid paper or a copy of the map or chart.

10. **Your teacher or his assistant will collect and mark your checks.** And sometimes you must ask him to watch or assist you as you do a check.

11. **Sometimes a review procedure will be suggested.** If you can't do a performance check, you may be asked to review a part of the text or a self-evaluation question. You may then be checked on the same material, so be sure you understand the material you review. Get help if you need it.

Why You're You **WYY**

1. State what parts of plants and animals make sperm.
2. What does a sperm do?

WYY
01-Core-1B

Eggs and sperm are involved in producing offspring of many organisms.
1. What is the source of an egg?
2. What is the function of an egg?

WYY
01-Core-2B

During the mating of animals, what happens to sperm?

WYY
01-Core-3B

Get some ether, an etherizer, and vial WYY-01-Core-4 from the supply area. Etherize the fruit flies in the vial. Have your teacher check the etherized fruit flies.

WYY
01-Core-4B

Get vial WYY-01-Core-5, two empty capped vials, an etherizer, and some ether from the supply area. Don't take any of the flies out of the vial at this point. Etherize the flies in the vial. Shake the vial gently. Remove the flies from the vial. Now put the etherized flies and the dead flies into separate vials. Cap the vials, and label each as containing dead or etherized flies. Have your teacher check your work. Return all the flies to the vial you got them from.

WYY
01-Core-5B

Get some ether, two empty vials with caps, an etherizer, and vial WYY-01-Core-6 from the supply area. Etherize the fruit flies. Put all the male flies into one of the empty vials and all the female flies into the other empty vial. Cap the vials, and label each as containing male or female flies. Have your teacher check your work. Return all the flies to the original vial.

WYY
01-Core-6B

State what you would do to obtain virgin female fruit flies from a vial containing nonadult and adult fruit flies.

WYY
01-Core-7B

Operationally define *pure strain*.

WYY
01-Core-8B

What are the stages in the life cycle of a fruit fly?

WYY
01-Core-9B

Get jar WYY-01-Core-10 and a hand lens from the supply area. Point out to your teacher the egg, the larva, the pupa, and the adult stages in the jar.

WYY
01-Core-10B

What appearance would be possible for first-generation offspring of a cross between fruit flies that are pure strain for bristles on their bodies and fruit flies that are pure strain for no bristles on their bodies?

WYY
01-Core-11B

WYY 01-Core-12B

Flowers have many different features that show variation. In one experiment, Peter studied only one feature, flower color, even though flowers inherit many features at one time. Why would Peter study the inheritance of only one feature at a time?

WYY 01-Core-13B

Verna crossed bean plants that were pure strain for green pods with bean plants that were pure strain for yellow pods. Then she crossed the first-generation offspring to get the second-generation offspring. Predict the appearance of the first- and second-generation offspring of this cross by choosing the correct descriptions below.

1. Among the first-generation offspring
   a. all plants had the same color pods.
   b. some plants had green pods and some plants had yellow pods.
2. Among the second-generation offspring
   a. all plants had the same color pods.
   b. some plants had green pods and some plants had yellow pods.

WYY 01-Core-14B

Sam crossed two pure-strain plants. One had orange flowers, and the other had blue flowers. He crossed the first-generation offspring with each other. Predict the most likely ratio of variations of flower color he will get in the second-generation offspring.

WYY 01-Core-15B

Tell your teacher that you are about to do this check.

In the supply area, you will find a box of beans labeled WYY-01-Core-15. You are to estimate the ratio of the white beans to the brown beans in the box quickly and accurately.

WYY 01-Core-16B

Get vial B from box WYY-01-Core-16 in the supply area. Look at the beans carefully. Are they pure-strain beans?

WYY 01-Core-17B

The table below refers to the offspring produced by mating two petunia plants, both of which had red flowers.

GENERATION	FLOWER COLOR
Parents	red
1st-generation offspring	red
2nd-generation offspring	red

1. According to the ISCS two-bit model, is this variety of petunias pure strain for flower color?
2. Explain your answer.

Suppose you crossed a pure-strain dwarf marigold plant with a pure-strain giant marigold. Which statement best describes the first-generation offspring of this cross?

WYY
01-Core-18B

a. There will be a 3-to-1 ratio of giant marigolds to dwarf marigolds.
b. Half the plants will be dwarf, and half will be giant.
c. All the plants will be of a medium height.
d. Either all the plants will be dwarf, or all the plants will be giant.
e. There will be a 3-to-1 ratio of dwarf marigolds to giant marigolds.

Suppose you were to cross sweet pea plants that were pure strain for red flowers with sweet peas that were pure strain for yellow flowers. Select the statement that best describes the appearance of the second-generation offspring of this cross.

WYY
01-Core-19B

a. All of the flowers will be orange.
b. Some plants will have all yellow flowers, and the others will have all red flowers. There will be a 3-to-1 ratio of the colors.
c. All of the plants will have half red flowers and half yellow flowers.
d. All of the plants will have one-color flowers, but I cannot tell if they will be yellow or red.
e. Half of the plants will have all red flowers, and the other half will have all yellow flowers.

Two pure strains of wheat were crossed. In the second-generation offspring of this cross, there were 71 dwarf plants and 198 tall plants.

WYY
01-Core-20B

1. What did the wheat plants in the first-generation offspring look like?
2. What did the parent wheat plants look like?

Your teacher will observe you for this check when he can.

WYY
01-Core-21B

Your teacher will observe you for this check when he can.

WYY
01-Core-22B

Your teacher will observe you for this check when he can.

WYY
01-Core-23B

Your teacher will observe you for this check when he can.

WYY
01-Core-24B

Your teacher will observe you for this check when he can.

WYY
01-Core-25B

The word *cross* appears in reports of experiments done to find out how characteristics are inherited. Give a definition of the word *cross* as it is used in such reports.

WYY
01-Exc 1-1-1B

WYY
01-Exc 1-2-1B

Below are two definitions of ways in which people differ. Study these definitions, and answer the questions that follow.

Definition a: A person's *gold-finding index* is his ability to find gold mines.
Definition b: A student's *kick index* is a measure of how far he can kick a soccer ball. It is determined by measuring in meters how far he can kick a properly inflated soccer ball.

1. Which of the above is an operational definition?
2. Explain the reason for your answer.

WYY
01-Exc 1-2-2B

Whenever possible, there are two questions an operational definition of anything should answer. What are those questions?

WYY
01-Exc 1-3-1B

Many insects, such as fruit flies, have a short life cycle. In Florida there are few, if any, of these insects around during the winter, but they are plentiful during the rest of the year. Explain why so very few of these insects develop during the winter.

WYY
01-Exc 1-4-1B

What is the total number of bits of information that all of Cheryl's great-grandparents had for the feature hitchhiker's thumb.

WYY
01-Exc 1-4-2B

Lucy has black hair. Her great-great-great-grandmother Mary had black hair, her great-great-great-grandfather Michael also had black hair, and her great-great-great-grandfather Herbert had blond hair.

1. Can you determine which of her three great-great-great-grandparents contributed the bits for Lucy's black hair?
2. Explain your answer.

WYY
01-Exc 2-1-1B

Susan found after a party that her guests had drunk 15 colas and 7 orange soda pops. What is the rough ratio of colas to orange pops that her guests drank? Express the ratio to the nearest tenth, or 1 decimal place.

WYY
01-Exc 2-1-2B

Nancy calculated the rough ratios shown below. Convert these to rounded-off ratios.

1. 3.2 to 1
2. 1.9 to 1
3. 7.1 to 1
4. 12.8 to 1

When examining the second-generation offspring of a cross between two pure-strain parent flies, Richard noticed that the length of the bristles on their bodies were not the same on all the flies. He counted 22 flies with long bristles and 7 with short bristles.

WYY
02-Core-1B

1. What was the bristle length of each of the original pure-strain parents?
2. What was the bristle length of the first-generation offspring?

If you cross pure-strain, yellow-bodied fruit flies with pure-strain, normal-colored flies, you find that all of the first-generation offspring have normal body color. If you then cross the first-generation offspring, what will be the ratio of yellow-bodied flies to normal-colored flies in the second-generation offspring?

WYY
02-Core-2B

Choose the statement below that best describes the pattern by which features are passed from parents to offspring.

WYY
02-Core-3B

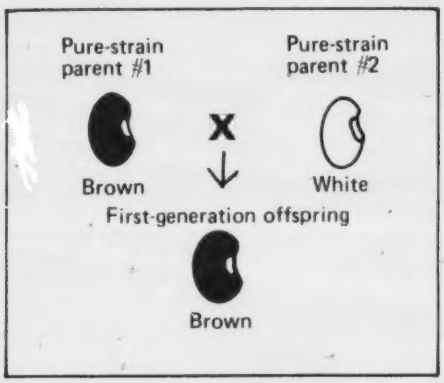
a. The features of the offspring are identical to those of their parents.
b. The features of the offspring are different from those of both of their parents.
c. The male offspring show the same features as their male parent, and the female offspring have the same features as their female parent.
d. The offspring generally show some features in common with each of their parents.

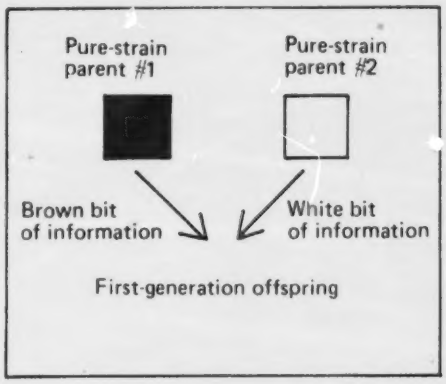
Dr. Bean is a scientist who studies patterns of inheritance. What do you call Dr. Bean's area of scientific study?

WYY
02-Core-4B

The figures below show a possible way to explain a cross between brown beans and white beans, using the one-bit model of inheritance. State the assumptions of the one-bit model of inheritance.

WYY
02-Core-5B





WYY
02-Core-6B

Why is the one-bit model not a satisfactory model of inheritance for most features?

WYY
02-Core-7P

There are two models for gravity – a particle model and a force model. Select the most important reason for deciding why you should accept one model rather than the other.

a. A book said that one is correct.
b. One model involves less math.
c. One model agrees more closely with the experimental evidence.
d. One model is more complicated than the other.
e. Most people say that one model is better than the other.

WYY
02-Core-8B

What are the assumptions of the two-bit model of inheritance?

WYY
02-Core-9B

The inheritance of flower color in zinnias follows the two-bit model. Red color masks yellow color. Suppose you crossed pure-strain yellow zinnias with pure-strain red zinnias.

1. Predict the color of the flowers of the first-generation offspring of this cross.
2. Predict the color of the flowers of the second-generation offspring of this cross. Include a ratio in your answer.

WYY
02-Core-10B

A plant that is pure strain for the masked (recessive) variation of a feature is used in a test cross. Why is it used rather than a plant that is pure strain for the masking variation?

WYY
02-Core-11B

Bertha crossed two pure strains of flowers. One was pure strain for red flowers (RR), and the other was pure strain for white flowers (rr). Her data are shown below.

GENERATION	PLANTS WITH WHITE FLOWERS	PLANTS WITH RED FLOWERS
Parents	1	1
1st-generation offspring	0	18
2nd-generation offspring	87	34

1. Can you explain these data, using the two-bit model of inheritance?
2. Explain your answer.

Suppose that a scientist performed a crossing experiment and his results did not agree with the two-bit model. To check his results, the scientist repeated the experiment several times and got the same results. Select the answer that best describes what he should do.

WYY
02-Core-12B

a. Devise a new model which explains only his new results.
b. Change his data to agree with the two-bit model.
c. Try to change the two-bit model so that it explains both his new data and the old data.
d. Publish a paper giving his data and stating that the two-bit model is wrong and must be thrown out.
e. Ignore the results of his experiment because they do not agree with the two-bit model.

George wanted to find out if the purple-flowering snapdragons he had were pure strain for flower color. He knew that the bit for purple flowers would mask the bit for yellow flowers. He crossed his unknown snapdragons with some that he knew were pure strain for purple flower color. All the first-generation offspring of this cross had purple flowers.

WYY
02-Core-13B

1. Was the unknown plant pure strain for purple flowers?
2. Explain your answer.

A student wants to determine if a lily that produces orange flowers is pure strain for flower color. He knows that the bit for orange flowers will mask the bit for yellow flowers. He test-crosses the orange-flowering lily with a pure-strain lily that produces yellow flowers. Half the first-generation offspring have orange flowers and half have yellow flowers.

WYY
02-Core-14B

1. Is the unknown lily plant pure strain for flower color?
2. Explain your answer. You may wish to include a diagram in your explanation.

Frank wants to find out if a sweet pea plant with red flowers is pure strain for flower color. He knows that the bit for red flowers masks the bit for white flowers in sweet peas. He test-crosses the unknown red-flowered plants with a pure-strain white-flowering sweet pea. All of the first-generation offspring of this cross produce red flowers.

WYY
02-Core-15B

1. Is the unknown red-flowering sweet pea pure strain for flower color?
2. Explain your answer.

A pure-strain plant with yellow pods is crossed with a plant that is pure strain for green pods. All the first-generation offspring of this cross have yellow pods. Explain why there are no first-generation offspring that have green pods.

WYY
02-Core-16B

State the meaning of the term *recessive bit* as it is used in the two-bit model.

WYY
02-Core-17B

WYY
02-Core-18B

What does the term *dominant bit* mean as it is used in the two-bit model?

WYY
02-Core-19B

Suppose that research was done involving the feature variations shown below. The report used the symbols in the right-hand column of the table. After the number of each feature variation, state whether it is dominant or recessive.

FEATURE VARIATION	SYMBOL FOR THE BIT OF INFORMATION
1. Yellow seeds	P
2. White hair	m
3. Red eyes	q
4. Purple flowers	B

WYY
02-Core-20B

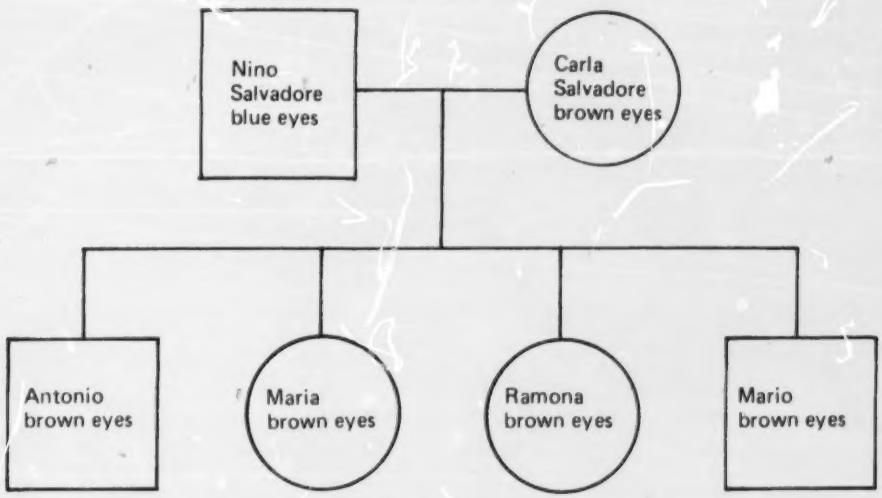
Write the numbers of the feature variations listed below. After each number, write a symbol to represent each feature variation.

1. Green eyes (recessive)
2. Short wings (recessive)
3. Red flowers (dominant)
4. Yellow pods (dominant)

WYY
02-Core-21B

Nino's parents and grandparents all had blue eyes. Carla's parents and grandparents all had brown eyes.

THE NINO SALVADORE FAMILY

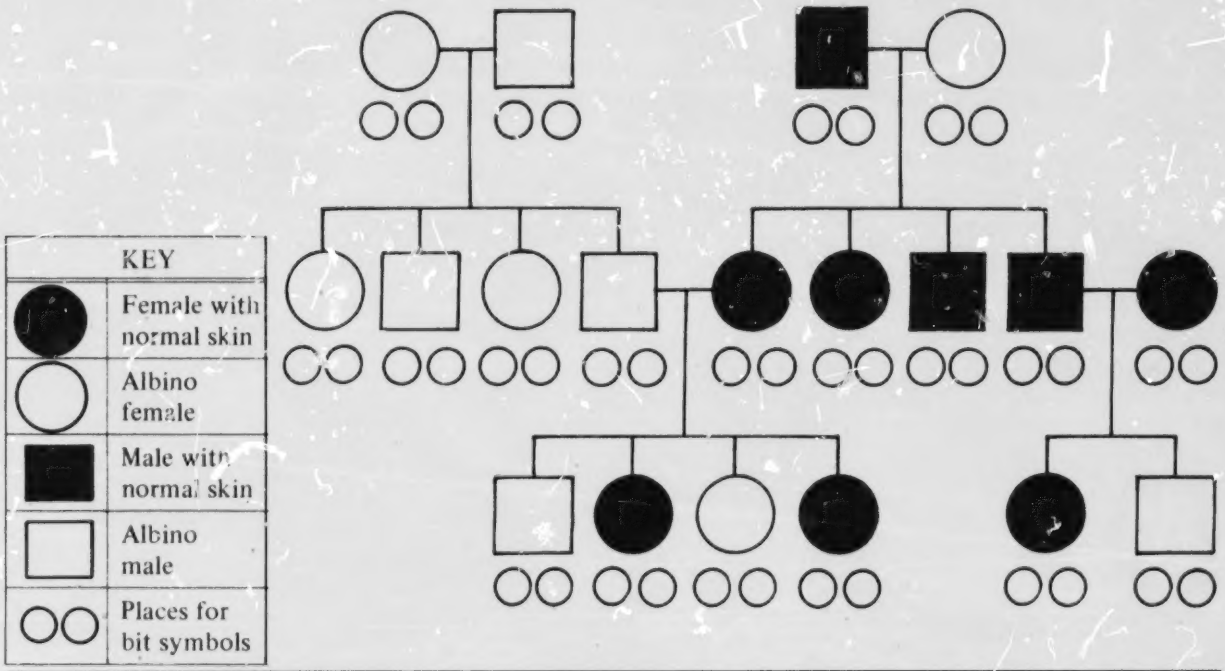


1. In the Nino Salvadore family which variation – blue eyes or brown eyes – is dominant?
2. Which variation is recessive?
3. State the reason for your answers to questions 1 and 2.

A large family was surveyed to determine the pattern by which the total lack of skin pigment (albinism) is inherited. The albino variation was found to be recessive to normal pigmentation.

WYY
02-Core-22B

Ask your teacher for a copy of the chart below or paper to trace it. Determine the bits that each of the individuals shown in the chart could have. On your chart write the bit symbols in the small circles below each large symbol. Use N to represent the bit for normal skin and n to represent the bit for albinism.



The bit for brown color in some bean seeds is dominant over the bit for white color. Suppose you cross plants which produce brown beans with plants which produce white beans.

WYY
02-Core-23B

1. Will the beans of the first offspring bean plant be brown?
2. Explain your answer.

Construct an inheritance chart for the inheritance of tongue-rolling ability for the families described below. Use squares and circles and shading and nonshading. Near each square or circle, write the person's name and a possible pair of bits which that person may have. Use R for roller and r for nonroller.

WYY
02-Core-24B

Grandfather John Smythe is a roller, but Grandmother Ann Smythe is a nonroller. Their children, Mark and Luke, are rollers.

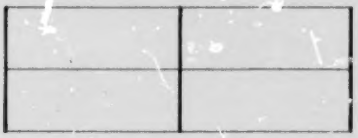
Grandfather Pete Johnson is a nonroller, but Grandmother Mary Johnson is a roller. Their girl, Mary, is a roller, but their other child, Sam, is a nonroller.

Luke Smythe marries Mary Johnson. Their boy, Ted, is a roller. Their other child, Lois, is a nonroller.

WYY
02-Exc 4-1-1B

The bit for rough coat (R) is dominant over the bit for smooth coat (r) for guinea pigs. Suppose you crossed a rough-coat guinea pig (Rr) with a smooth-coat guinea pig (rr).

1. Use a chart like that shown below to determine the possible combinations of bits that the offspring could have.
2. What is the ratio of rough-coat offspring to smooth-coat offspring?



A certain breed of dog has seven features that show variation. They are length of hair, curliness of hair, hair color, spottedness of coat, shape of nose, length of tail, and droopiness of ears. According to the two-bit model, what is the total number of bits that a dog of this type receives for all of these seven features?

WYY 03-Core-1B

A type of dog receives information for hair length, hair curliness, hair color, spottedness of coat, and eye color. The possible variations of these features are shown below.

WYY 03-Core-2B

KEY				
FEATURE	BIT	VARIATION	BIT	VARIATION
Hair length	S	short	s	long
Hair curliness	C	curly	c	straight
Hair color	b	brown	B	black
Spottedness of coat	u	spotted	U	unspotted
Eye color	R	brown	r	blue

Use the key above and the two-bit model to determine the appearance of the dog that inherited the bits shown in the table below. List the feature numbers, and after each number state the variation of the feature that the dog will show. (Example: 1. long)

FEATURE NUMBER	FEATURE	BIT 1	BIT 2
1	hair length	s	s
2	hair curliness	c	C
3	hair color	B	B
4	spottedness of coat	U	u
5	eye color	r	R

Suppose you found that the results of an experiment you did with fruit flies did not agree with the predictions of the two-bit model.

WYY 03-Core-3B

1. What should you do to establish the value of your results?
2. How can your results affect the model?

People who studied inheritance patterns before Mendel did were unsuccessful in understanding them. State two reasons why Mendel was successful in understanding these patterns.

WYY 03-Exc 6-1-1B

WYY
03-Exc 6-1-2B

People who studied inheritance before Mendel did were unsuccessful in understanding how it worked. Mendel used mathematics, a model, and the systems approach. Explain why each of these is helpful in solving a scientific problem.

WYY
03-Exc 6-2-1B

In zinnias, the bit for tallness (T) is dominant over the bit for dwarfness (t). The bit for red flowers (R) is dominant over the bit for yellow flowers (r). Suppose you had a zinnia plant that was pure strain for dwarfness (tt) and for red flowers (RR). You crossed that plant with one that was pure strain for tallness (TT) and for yellow flowers (rr). Predict the appearance of the first-generation offspring of this cross.

WYY
03-Exc 6-2-2B

You may refer to Excursion 6-2 to help you answer this check. In zinnias, the bit for tallness (T) is dominant over the bit for dwarfness (t). The bit for red flowers (R) is dominant over the bit for yellow flowers (r). Suppose you had a zinnia plant that was pure strain for dwarfness (tt) and for red flowers (RR). You crossed this plant with one that was pure strain for tallness (TT) and for yellow flowers (rr). Predict the ratio of the feature variations that you would find in the second-generation offspring of this cross.

WYY
03-Exc 7-1-1B

When a black Andalusian chicken (BB) is mated with a white Andalusian rooster (WW), the offspring are a mixed black and white that appears blue (BW). The genetic bits for color do not seem to mask each other completely. Copy the charts below. Then predict the appearance of the offspring of the two separate crosses.

Chart 1.

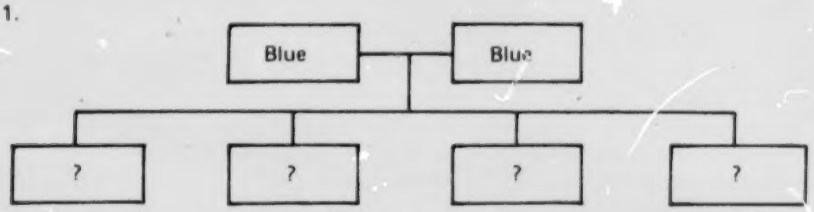
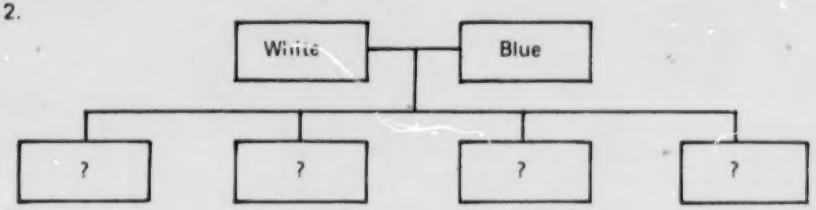


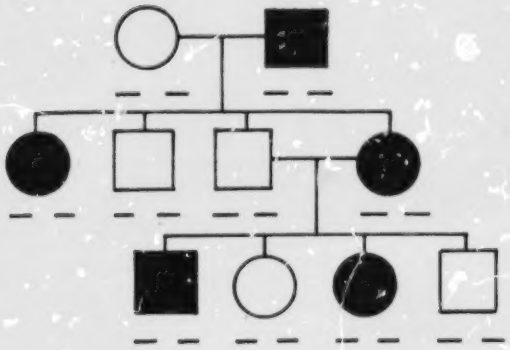
Chart 2.



Get from your teacher a copy of the chart below or paper to trace it.

WYY
03-Exc 7-2-1B

In some insects, inheritance of wing length is related to the sex of the insect. In the males, short wings are dominant over long wings. In the females, long wings are dominant over short wings. Indicate on your chart a possible pair of bits carried by each of the insects. Represent the bit for long wings with W and for short wings with w.



KEY	
■	Male with long wings
□	Male with short wings
●	Female with long wings
○	Female with short wings
– –	Places for bit symbols

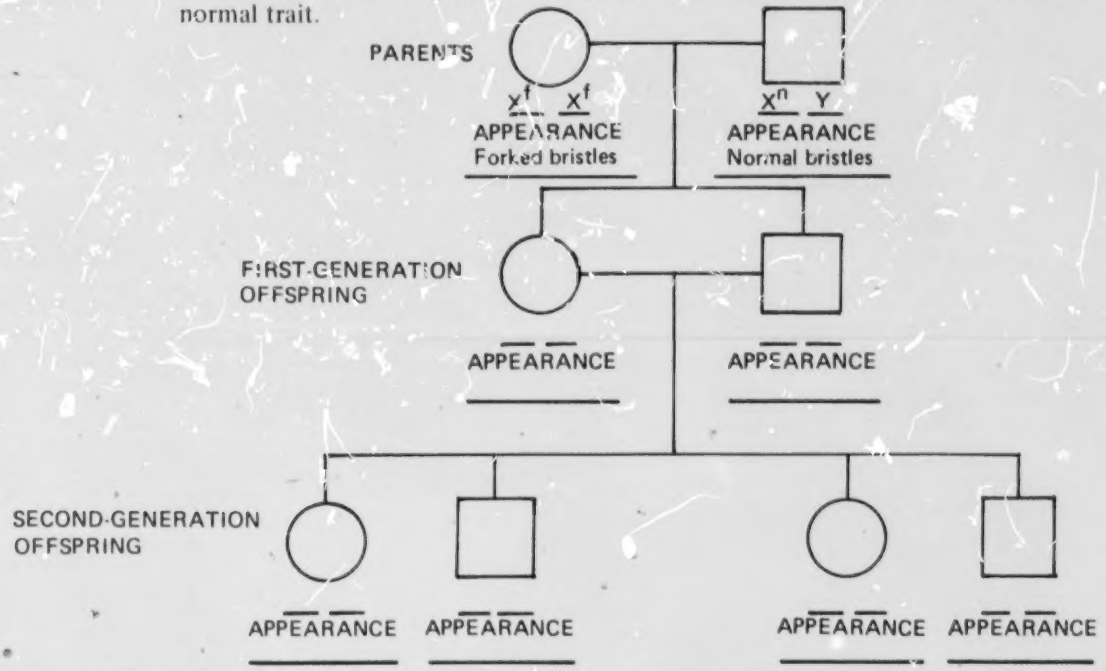
Archie Sanford has three lovely daughters, but he complains because he does not have any sons. He blames his wife for this.

WYY
03-Exc 7-3-1B

1. Is his reasoning logical when he blames his wife for producing only daughters?
2. Explain your answer.

WYY
03-Exc 7-4-1B

Get a copy of the chart labeled WYY-03-Exc 7-4-1 from your teacher. You may use Excursion 7-4 to help you do this check. In fruit flies, the X chromosome carries the bit for the recessive variation forked bristles (X^f). The Y chromosome carries no information for this feature. The appearance of and bits for the parents are given in the chart below. You are to predict the appearance of and the bits (X^f, X^n, and Y) that will be carried by the first- and second-generation offspring of the cross by filling in the blanks on your copy of the chart. Remember that X^n represents the normal trait.



WYY
03-Exc 7-5-1B

Ron and Don are identical twins. Like other identical twins, they both received identical sets of genetic material from their parents. However, Ron and Don do not look exactly alike as adults. State what might have caused these differences.

WYY
03-Exc 7-6-1B

Suppose that a year ago you released one hundred black snakes and one hundred green snakes on a rocky island. The island is made of black volcanic rock, and there is little vegetation. On the island there is a small flock of birds who will occasionally eat a snake.

1. Would you predict that there are more of one kind of snake than of the other now living on the island?
2. Explain your answer.

WYY
03-Exc 7-7-1B

The Yoruba tribe of Nigeria have been making scars on the cheeks of their babies for many generations. Suppose this practice is done for many more generations.

1. Will this practice eventually cause Yoruba children to be born with bits of information for scars on their cheeks?
2. Explain your answer.

Investigating Variation

IV

Below are two definitions of ways in which people differ. Study these definitions, and answer the questions that follow.

IV
01-Core-1B

Definition a: A person's *gold-finding index* is his ability to find gold mines.
Definition b: A student's *kick index* is a measure of how far he can kick a soccer ball. It is determined by measuring in meters how far he can kick a properly inflated soccer ball.

1. Which of the above is an operational definition?
2. Explain the reason for your answer.

Whenever possible, there are two questions an operational definition should answer. What are those questions?

IV
01-Core-2B

Perhaps you have heard people make statements such as "All people over 30 are the same."

IV
01-Core-3B

1. Can a statement like this ever be true?
2. Explain the reasons for your answer.

Why do scientists spend a great deal of time looking for patterns in the way things change?

IV
01-Core-4B

Junior high school pupils differ in their ability to jog around the school track. The distance they can jog is called the *jogging index*. Write an operational definition of *jogging index*.

IV
01-Core-5B

Suppose you wanted to compare the ability of different students in your class to play the banjo. From the choices below, select the best way of measuring banjo-playing ability.

IV
01-Core-6B

a. Ask each person how well he can play the banjo.
b. Ask each person how many banjo lessons he has had.
c. Ask each person to tell who his banjo teacher is.
d. Ask each person to play the banjo, and judge how well each does.
e. Ask each person to play the same unfamiliar songs, and count the number of mistakes each makes.

What is an advantage of using a measuring device, such as a ruler or a test, rather than just relying on your senses when you want to compare different things?

IV
01-Core-7B

IV
01-Core-8B

Burt was measuring reaction time, using the dropping-meterstick method. He found that Linda had a much shorter reaction time than anyone else. He also noticed that she watched his hand release the meterstick. All the other students had watched their own fingers with which they caught the meterstick. Burt concluded that a student's reaction time, as measured by the dropping-meterstick method, is shorter when he watches the release of the meterstick than when he watches the catch point. Describe an activity that you could perform to test this idea.

IV
01-Core-9B

When a textbook says that a feature shows continuous variation, what does that mean?

IV
01-Core-10B

When we say that a feature shows an *either-or* variation, what do we mean?

IV
01-Core-11B

Identify each of the variables below either as a continuous variable or as an either-or variable.

1. Whether a person has ever been to Australia
2. How fast a secretary can type
3. The length of a girl's hair
4. A man's age
5. If a man is a fireman or not

IV
01-Core-12B

Stu measured the distances the students in his homeroom could swim. His measurements in meters are shown below.

Henry – 152	Jim – 153	Janice – 145
Fred – 150	Lynn – 153	Wayne – 165
Wendy – 140	Louise – 173	Amy – 167
Bruce – 180	Mary – 162	Stephanie – 158
Betty – 162	Nadine – 147	George – 165
Sally – 167	Brian – 178	Fran – 140

Copy the table shown below, and complete it, using Stu's measurements.

DISTANCE (in m)	TALLY	TOTAL
139-146		
147-154		
155-162		
163-170		
171-178		
179-186		

IV
01-Core-13B

Scientists usually arrange their data in charts, tables, or graphs. State two reasons that they do this.

Luis wanted to determine how many students in his class had had measles only once and how many had had measles more than once. Construct a table for collecting and analyzing his measurements.

IV
01-Core-14B

Holly wanted to measure the number of words her classmates could type per minute. She gave each of the students the same paragraph to copy. She had them begin typing at the same time. After they had typed for one minute, she told them to stop. Her data are shown in the table below. Construct another table of all her typing speed measurements from which Holly will be able to construct a histogram. (Note: You need only to construct the table, not to enter the data on the table.)

IV
01-Core-15B

STUDENT	NUMBER OF WORDS TYPED	STUDENT	NUMBER OF WORDS TYPED
Ellen	70	Orvil	68
Harry	30	Olive	59
Gene	23	Esther	42
Alice	46	Abraham	36
Fred	50	Ken	50
Ted	51	Celia	55
Enid	37	Liza	48
Grace	36	Lionel	69

Fred wants to determine if there is any relationship between whether a student is right-handed or left-handed and whether that student is male or female. Construct a table for collecting and analyzing measurements to find out if these variables are related.

IV
01-Core-16B

Jerry wants to find out whether a relationship exists between the sex of a student and the number of extracurricular activities he or she participates in. Construct a table for collecting these measurements.

IV
01-Core-17B

Your teacher will observe you for this check when he can.

IV
01-Core-18B

Your teacher will observe you for this check when he can.

IV
01-Core-19B

Your teacher will observe you for this check when he can.

IV
01-Core-20B

IV
01-Core-21B

Your teacher will observe you for this check when he can.

IV
01-Core-22B

Your teacher will observe you for this check when he can.

IV
01-Exc 1-1-1B

1. Suppose you measured the length of a yardstick in metric units. Which of the measurements given below would be closest to your measurement?

a. .91 m
b. 910 cm
c. 91 mm
d. 9.1 m
e. .91 cm
f. 9.1 cm

2. Suppose you measured the thickness of your ISCS textbook in metric units. Which of the measurements given below would be closest to your measurement?

a. 70 mm
b. 7 m
c. 700 m
d. 7 cm
e. 0.7 mm
f. 7 mm

IV
01-Exc 1-1-2B

1. What is the distance between A and B in centimeters?
2. What is the distance between B and C in millimeters?

IV
01-Exc 1-1-3B

Rick measured the width of a piece of lumber as 21.47 cm. Frank measured the width of the same piece of lumber as 21.44 cm. What is the most likely reason for the difference in their measurements?

IV
01-Exc 2-1-1B

Calculate the average of the following measurements to one decimal place.

3.4 cm
4.3 cm
8.7 cm
5.2 cm

Round off the following measurements to the nearest whole number. **IV**
01-Exc 2-1-2B

1. 241.1 m
2. 646.8 m
3. 919.2 m
4. 595.5 m
5. 627.0 m

Arlene measured the handedness of each of her classmates. She separated the results for the boys and girls. Her data are shown below. **IV**
01-Exc 2-2-1B

		HANDEDNESS		
		LH	RH	Totals
SEX	Boys	5	12	17
	Girls	3	10	13
	Totals	8	22	30

Suppose someone made the statement that girls are more likely to be left-handed than boys.

1. Could you use Arlene's data to tell if the statement is correct?
2. Explain your answer.

Suppose someone else said that boys are more likely to be right-eyed than girls.

3. Could you use Arlene's data to tell if this statement is correct?
4. Explain your answer.

State whether each of the pairs of words below represents a continuous or an either-or variable.

IV
02-Core-1B

1. High or low
2. Left or right
3. Dog or cat
4. Skinny or fat

Sally's data showed a wide range. State an operational definition for the term *range* as it is used in that sentence.

IV
02-Core-2B

Rick measured the number of sit-ups the boys in his class could do. His data are shown below.

IV
02-Core-3B

STUDENT	NUMBER OF SIT-UPS	STUDENT	NUMBER OF SIT-UPS
Chris	55	Steve	12
Emmy	63	Brian	42
Luis	15	Dave	48
Bill	8	Frank	52
Robert	10	Larry	60

What is the range of his measurements?

Give an operational definition for the *mean* of a set of measurements.

IV
02-Core-4B

Dominic measured how long it took each of the boys in his class to run 100 meters. His data are shown below.

IV
02-Core-5B

STUDENT	TIME (in sec)
Tim	16
Nick	14
George	18
Alan	17
Steve	13
Sam	15
Hank	20
Sonny	14

Calculate the mean of his measurements to the nearest whole number.

IV
02-Core-6B

Give a definition of the *mode* of a set of measurements.

IV
02-Core-7B

Betty asked her classmates to keep track of the number of hours they spent reading for pleasure in one week. Her data are shown below.

STUDENT	TIME (in hours)	STUDENT	TIME (in hours)
Jose	10	Ethel	2
Glen	18	Amelia	4
Carlos	9	Saul	13
Wayne	4	Nino	11
Jack	3	Sally	7
Chris	20	Esther	5

What is the mode of this set of measurements?

IV
02-Core-8B

Hester measured the height of each student in her class. Her table of data is shown below.

HEIGHT (in inches)	NUMBER OF STUDENTS
50-52	1
53-55	3
56-58	4
59-61	5
62-64	3
65-67	2
68-70	2
71-73	1

Get a piece of graph paper from your teacher. On it, construct a histogram of Hester's data.

IV
02-Core-9B

Data are often arranged in histograms or in other kinds of graphs. Why?

Larry measured the number of push-ups each member of the school football team could do. His data are shown below.

IV
02-Core-10B

63 59 58 60 70 58 61 71 59 73
62 65 58 60 62 63 61 64 67 54
55 61 64 62 68 57 60 59 58 61

Construct a table like the one below, and group Larry's data in fifths.

FIFTH	LIMITS OF RANGE FOR THAT FIFTH	NUMBER OF INDIVIDUALS
1		
2		
3		
4		
5		

Scientists will often do an experiment, collect some data, and draw a conclusion from their data. Then they will repeat the experiment, collecting even more data. Often experiments are repeated many times. Why?

IV
02-Core-11B

When you measured each student's peripheral vision, you made three measurements and averaged them. You might have taken only one measurement and avoided extra work. Why did you take three measurements and average them?

IV
02-Core-12B

The students of Central Junior High School were selling tickets to raise money for the class dance. Hank was in charge of keeping the records for his class. The number of tickets each student sold is shown below.

IV
02-Core-13B

1. Is the number of tickets Rick sold above or below the mean for the whole class?
2. How far above or below the mean is it?

STUDENT	NUMBER OF TICKETS SOLD
Harold	15
Jim	9
Cindy	23
Karen	5
Lloyd	2
Tony	9
Doug	22
Fred	0
Ted	11
Rick	15

IV
02-Core-14B

Joseph measured the thickness of several books in the school library. The table below shows the thickness of each book in centimeters.

BOOK NUMBER	THICKNESS (in cm)
1	4
2	3
3	6
4	8
5	3
6	6
Total thickness	30
Mean thickness	5

How is it possible for the mean thickness to be 5 cm although none of the books were 5 cm thick?

IV
02-Core-15B

A group of students were making a list of human traits. One student asked his friends to describe for him what an average (normal) person is. Robert read from the text that "Perhaps the best example of an average person is someone whose characteristics are *not* average." Explain what the text means by that statement.

IV
02-Core-16B

Ezra measured a certain kind of sea shell. The shell's length was 10 cm.

1. Based only on the data above, is it possible to determine if the shell is a large, medium, or small shell?
2. Explain the reason for your answer.

IV
02-Core-17B

Ricardo tested some of his friends both for sensitivity to touch and for their ability to locate objects by hearing. He made his friends keep their eyes closed during the tests.

1. Was it necessary for them to keep their eyes closed during the tests?
2. Explain your answer.

Pam put 60 beans into a glass jar. She asked ten different people to estimate how many beans were in the jar. Their estimates are shown below.

IV
02-Core-18B

NAME	ESTIMATE
Grant	65
Hilda	70
Kay	55
Bill	50
Rose	74
Rich	54
Candi	40
Gail	40
Paul	77
Ron	45

What is the mean error of these estimates? Show your calculations.

Suppose you are given the assignment of calculating the mean error for a number of measurements of the length of time of an event. These measurements are estimates. Why is the mean error of measurements calculated?

IV
02-Core-19B

Peter tested several students to see how accurately they could estimate when 17 seconds had passed. His data are shown below.

IV
02-Core-20B

STUDENT	ESTIMATED TIME (in seconds)
Jim	18
Susan	16
Nancy	11
Frank	23
Carol	15
John	20
Sally	19
Mary	14
Wes	18
George	17

What is the mode error for the time sense of these students? Show your calculations.

IV
02-Core-21B

Dr. Roberts and Dr. Cooney are both interested in characteristics of various groups. They constantly measure patterns and similarities within groups being studied. Why are researchers like Dr. Roberts and Dr. Cooney more concerned about patterns and similarities than about individual differences?

IV
02-Core-22B

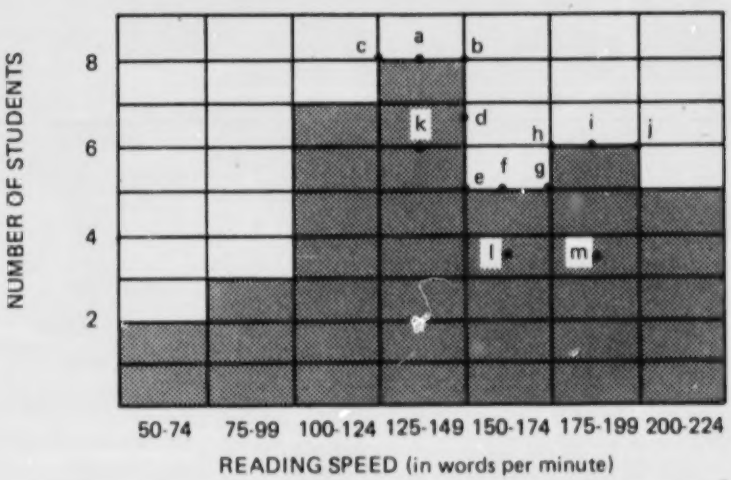
Peter calculated the mean height of all the students attending summer school. The mean height was 160 cm. Roger was one of the students in summer school

1. Using only the above information, can you determine Roger's height to the nearest centimeter?
2. Explain your answer.

IV
02-Exc 3-1-1B

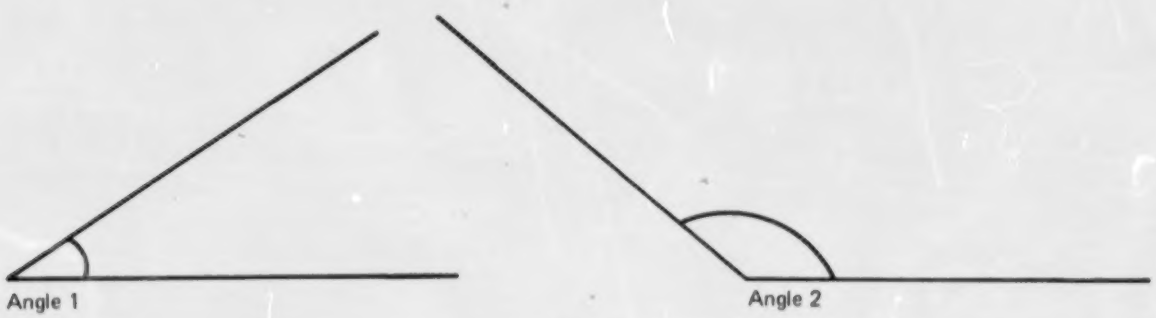
Mrs. Freed tested her students' reading speed. She plotted a histogram of the data collected.

1. List the letters of the points on the histogram that she should use to change the histogram into a line graph.
2. What are these points called?



IV
02-Exc 4-1-1B

Use a protractor to measure the size of the two angles below. Record your answers on a separate paper.



Use your protractor to construct angles of 35° and 118° on your answer sheet, and label each of them.

IV
02-Exc 4-1-2B

Animals with different characteristics often live in different areas, eat different food, and have different enemies. The chart below shows some of the differences between two kinds of animals.

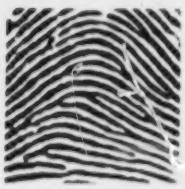
IV
02-Exc 4-2-1B

CHARACTERISTICS	ANIMAL A	ANIMAL B
Type of animal	small, hooved animal	large bird
Living area	mountainside	nests on trees
Main food	grasses	fish
Method of feeding	grazes grass	catches fish at the water's surface
Enemies	mountain lions and bobcats	man

1. Would it be advantageous for animal A to have its eyes in the sides of its head or in the front of its head?
2. Explain the reason for your answer.
3. Would it be advantageous for animal B to have its eyes in the sides of its head or in the front of its head?
4. Explain the reason for your answer.

In a recent police investigation, several standard fingerprints like those shown below were used as comparisons. Safe-cracking Sam belonged to the loop category in the standard file, yet his fingerprints were not exactly like the loop pattern in the standard set. Explain why.

IV
02-Exc 4-3-1B



Plain arch

Tented arch

Loop

Plain whorl

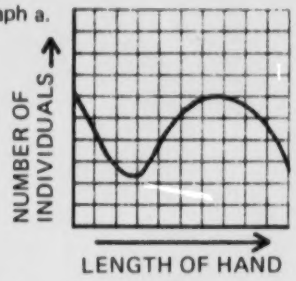
IV
02-Exc 5-1-1B

When researchers measure the characteristics of a population, they usually make measurements on only a sample of the population. Why is this done rather than making measurements of the entire population?

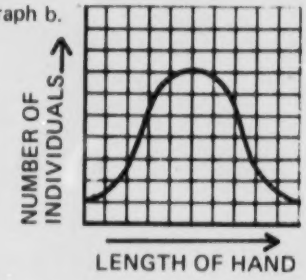
IV
02-Exc 5-1-2B

Which one of the curves below is a normal curve?

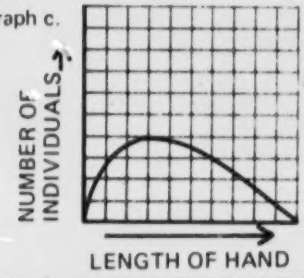
Graph a.



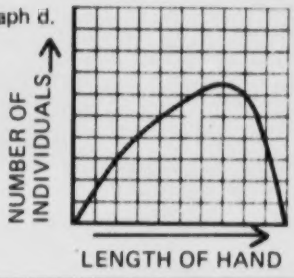
Graph b.



Graph c.



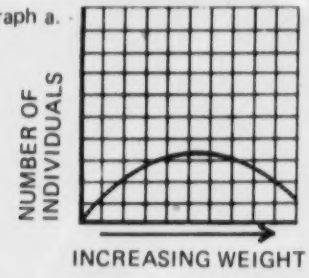
Graph d.



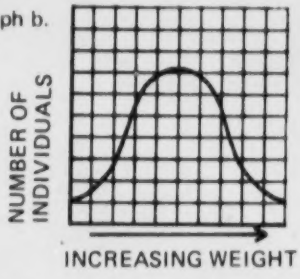
IV
02-Exc 5-1-3B

Suppose you were going to measure a continuous human variable such as weight. You would select a random sample of people, measure their weights, and draw a graph of the results. Which of the graphs below would you expect your graph to look like?

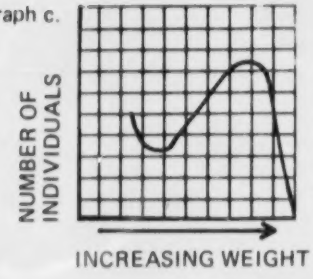
Graph a.



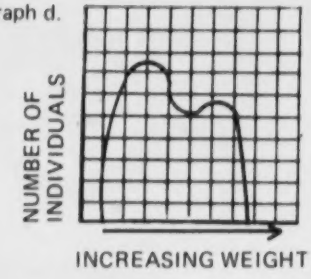
Graph b.



Graph c.



Graph d.



What is meant by the term *random sample*?

IV
02-Exc 5-1-4B

Researchers try to get a random sample when they investigate something. What is the purpose of a random sample?

IV
02-Exc 5-1-5B

Don wanted to determine how many movies the people in his neighborhood saw each month. He didn't have time to ask everybody in the neighborhood, so he decided to select a sample. He stood by the ticket booth of the neighborhood theater and asked the first 25 people who bought tickets how many movies they had seen in the last month.

1. Was his sample a random sample?
2. Explain your answer.

IV
02-Exc 5-1-6B